

Retrospective Study

Use of laparoscopy as the initial surgical approach of impalpable testes: 10-year experience

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Abstract

AIM: To review the experience in the management of impalpable testes using laparoscopy as the initial approach and the need for inguinal exploration.

METHODS: From January 2004 to June 2014, 339 patients with undescended testes underwent operation in our institute. Fifty patients (15%) had impalpable testes. All children with impalpable testes underwent initial laparoscopy. A retrospective review was conducted on this group of patients and the outcome was analyzed.

RESULTS: Forty children had unilateral impalpable testis. Ten children had bilateral impalpable testes. Thirty-one children (78%) in the unilateral group underwent subsequent inguinal exploration while 4 children (40%) in the bilateral group underwent inguinal exploration ($P < 0.05$). Orchidopexy was performed in 16 children (40%) in the unilateral group and 9 children (90%) in the bilateral group ($P < 0.05$). Regarding the 24 children with unilateral impalpable testis and underwent orchidectomy for testicular nubbin ($n = 19$) or atrophic testes ($n = 2$) or has vanishing testes ($n = 3$); contralateral testicular hypertrophy was noticed in 10 (41%). No intra-operative complication was encountered. Two children after staged Fowler-Stephens

procedure and 1 child after inguinal orchidopexy had atrophic testes.

CONCLUSION: The use of laparoscopy in children with impalpable testes is a safe procedure and can guide the need for subsequent inguinal exploration. Children with unilateral impalpable testis were associated with an increased need for inguinal exploration after laparoscopy. Orchidopexies could be performed successfully in 90% of children with bilateral impalpable testes.

Key words: Laparoscopy; Impalpable; Testis; Inguinal

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Core tip: Among over 300 children with undescended testis underwent operation, 15% of children had impalpable testis. The review studies the use of laparoscopy as the initial management of children with impalpable testes. Compared with children with bilateral impalpable testes, children with unilateral impalpable testis had an increased need for subsequent inguinal exploration and a lower incidence of successful orchidopexy. Laparoscopy is a safe procedure with no intra-operative complication encountered in this study.

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INTRODUCTION

Cryptorchidism is a common pediatric surgical condition that affected 2%-5% of new born^[1]. If left untreated, cryptorchidism poses risk in malignancy and infertility^[1-4]. In a child with a palpable testis at inguinal region, orchidopexy is recommended to be performed at 6-12 mo-of-age if spontaneous descend of the testis does not occurred by 6 mo-of-age^[3]. On the other hand, in a child with an impalpable testis, ultrasonography of the inguinal canal is required locate the testis in pre-operative evaluation^[4].

In the era of minimally invasive surgery, laparoscopy was advocated as the initial surgical approach in children with impalpable testes^[5-8]. Laparoscopy can confirm the presence or absence of intra-abdominal testes and can direct the subsequent approach. However, others suggested that inguinal or scrotal exploration should be used as the initial approach in children with unilateral impalpable testis^[9-11].

In our institute, all children with impalpable testes underwent initial laparoscopy. This study aimed to study the outcome of children using this approach.

MATERIALS AND METHODS

From January 2004 to June 2014, 339 boys with undescended testes underwent operation in our institute. Fifty children (15%) had impalpable testes. Impalpable testis was defined as the testis was not palpable under general anesthesia. The median age for children at the time of operation with impalpable testis was 26 mo (range: 8-192 mo). They all underwent laparoscopy as the initial procedure.

Operative procedure

All patients were examined again under general anesthesia and confirmed the diagnosis of impalpable testes. A sub-umbilical incision was made and a 5 mm 30 degree laparoscope was used. If the testis was identified intra-abdominally (Figure 1), two 3 or 5 mm ports were inserted over the abdomen; either one-stage laparoscopic or two-staged laparoscopic Fowler-Stephens orchidopexy was performed. If a blind ended vas was located away from the deep ring, the testis was defined vanished. If both vas and testicular vessels entered into the deep ring (Figure 2), an inguinal exploration was then performed. Inguinal orchidopexy was performed for normal looking testis. If a testicular nubbin or an atrophic testis was identified, it would be excised and sent for histological examination. For peeping testis, orchidopexy was performed by either inguinal or laparoscopic approach, depending on the surgeon's preference.

The age of the patients, the laterality of the testes, the presence of any contralateral testicular hypertrophy on physical examination, the laparoscopic findings and the need for inguinal exploration, the incidence of orchidopexy and any intraoperative and post-operative complication were reviewed.

Statistical analysis

Statistical analysis was accomplished using the SPSS program for Windows 21.0 (SPSS, Chicago, Illinois, United States). Fisher exact test was used to compare the categorical data. $P < 0.05$ was considered statistically significant. The statistical methods of this study were reviewed by Yuk Him Tam from the Prince of Wales Hospital.

RESULTS

Forty children had unilateral impalpable testis. Ten children had bilateral impalpable testes. Orchidopexy was performed in 16 children (40%) in the unilateral group and 9 children (90%) in the bilateral group ($P < 0.05$) (Figures 3 and 4).

Unilateral group

Regarding the 16 children who underwent orchidopexy, 12 children underwent inguinal orchidopexy (5 peeping testes), 3 children underwent Fowler-Stephens operation (1 peeping testis) and 1 child underwent laparoscopic

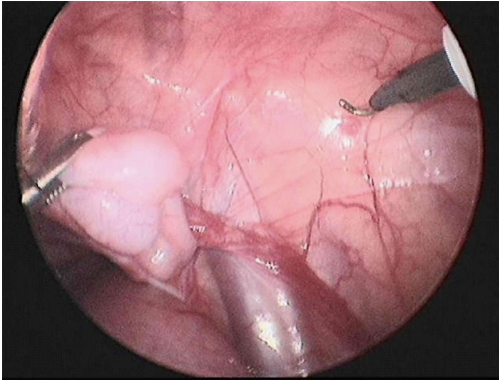


Figure 1 Laparoscopic view of a right undescended testis.

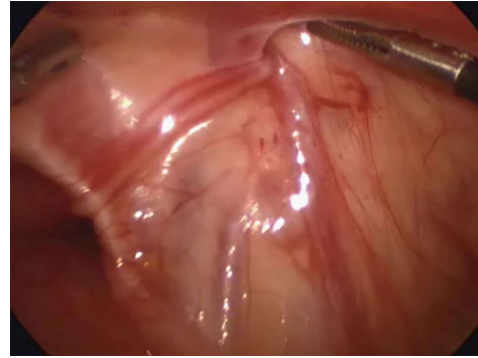


Figure 2 Vas deferens and vessel enter into the right deep ring, a groin exploration is required.

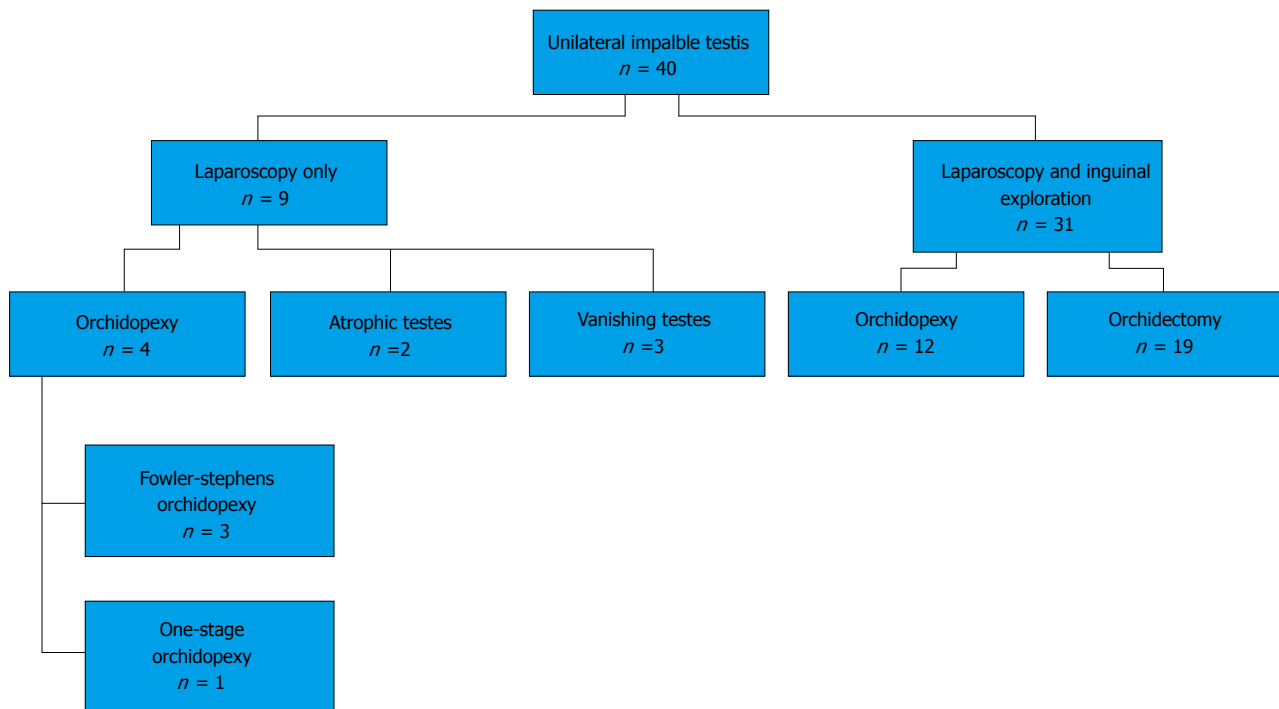


Figure 3 A flow chart showing the management of children with unilateral impalpable testis.

Table 1 The association of the need for inguinal exploration and orchidopexy in children with unilateral or bilateral impalpable testes

		Unilateral impalpable testis n = 40	Bilateral impalpable testis n = 10	P value
Inguinal exploration	Required	31	4	0.03
	Not required	9	6	
Orchidopexy	Performed	16	9	0.005
	Not performed	24	1	

one stage orchidopexy. Twenty-one children have "orchidectomy" performed for the testicular nubbin ($n = 19$) or atrophic testis ($n = 2$). Three children had vanishing testes. Out of the 24 children who underwent orchidectomy or has vanishing testes, contralateral testicular hypertrophy was noticed in 10 children (41%). Children with left impalpable testis has a lower rate of

orchidopexy (L: 35%, 9/17, R: 50%, 7/7), However the difference did not reach statistical significant (Figure 3, Tables 1 and 2).

Bilateral group

Orchidopexy were performed in 18 testes (90%). Inguinal orchidopexy was performed in 7 testes. Fowler–

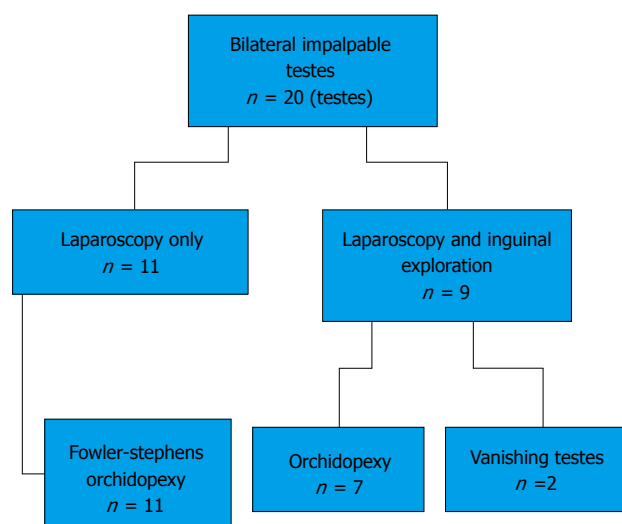


Figure 4 A flow chart showing the management of children with bilateral impalpable testes.

Stephens procedure was performed in 11 testes. One child had bilateral vanishing testes upon inguinal exploration (Figure 4).

Inguinal exploration

Thirty-one children (78%) in the unilateral group underwent subsequent inguinal exploration while only 4 children (40%) in the bilateral group underwent groin exploration ($P < 0.05$). In the unilateral group, children with left impalpable testis had a higher need for inguinal exploration (L: 85%, 22/26, R: 64%, 9/14) but the difference did not reach statistical significance (Tables 1 and 2).

Outcome

No intraoperative complication was encountered. Histological examination showed absence of testicular tissue in all the nubbins. Benign testicular tissues were identified in the 2 atrophic testes. The mean follow up was 53 mo (range 10 to 198 mo). Testicular atrophy was noticed in 2 children after 2nd stage Fowler-Stephen procedure and 1 child after inguinal orchidopexy.

DISCUSSION

There is ongoing debate on the best initial approach for impalpable testis. Our study showed in children with unilateral impalpable testis, 78% of children required an inguinal incision. In reports which used laparoscopy as the initial approach for impalpable testes, the need for inguinal or scrotal exploration for unilateral impalpable testis ranged from 38% to 85%^[12,13]. Ethnic, geographic and genetic reasons may account for the difference in the incidence of intra-abdominal testes in children with impalpable testes^[13-15]. Although a high proportion of children with unilateral impalpable testes required an inguinal incision, initial laparoscopy directed the subsequent approach without any intraoperative

Table 2 The association of the need for inguinal exploration and orchidopexy with the laterality of testes in children with unilateral impalpable testis

		Left n = 26	Right n = 14	P value
Inguinal exploration	Required	22	9	0.14
	Not required	4	5	
Orchidopexy	Performed	9	7	0.27
	Not performed	17	7	

complication encountered in this study.

Regarding the laterality of the unilateral impalpable testis, the testis was more commonly located on the left side (65%). Eighty-five percent of children with left impalpable testis had inguinal exploration while only 64% of children with right impalpable testis had inguinal exploration. Park *et al.*^[16] had similar finding in their study but other studies did not report the laterality of the testes^[7,8]. In children with bilateral impalpable testes, only 40% of children in this study required additional inguinal exploration. Sixty-five percent (13/20) of testes can be managed by laparoscopy alone, including 2 vanishing testes.

Fifty three percent of children with unilateral impalpable testis underwent orchidectomy. Majority of children had either a testicular nubbin or a vanishing testis. Intrauterine loss was the postulated etiology in children with unilateral impalpable testis^[17]. Studies showed if contralateral testicular size larger than 1.8 cm predict testicular loss on the symptomatic side^[11,17]. In this study, we used subjective manual assessment, which may not be as accurate as the measurement by ultrasonography. Although only 41% of children with unilateral testicular loss showed contralateral testicular hypertrophy, this physical finding can provide additional information in pre-operative counseling.

Germ cell was reported to be present in up to 16% of the testicular nubbin specimen^[18]. In this study, pathological study of the testicular nubbin did not detect any testicular tissue. We think it is still a reasonable approach the removed the nubbin in order to confirm the histology.

The success rate after laparoscopic assisted orchidopexy was 87% (13/15). There were reports studying the success rate of different laparoscopic approaches including one-stage laparoscopic repair, one-stage Fowler-Stephens or two-stage Fowler-Stephens repair^[19-21]. The assessment on the feasibility of one stage laparoscopic repair may be difficult. Two-stage Fowler-Stephens orchidopexy may be the treatment of choice for all intra-abdominal testes, if there was any doubt in decision of the laparoscopic approach intra-operatively^[22].

One of the limitations of this study is on the decision of surgical approach in peeping testis. Five out of 6 peeping testes were managed by inguinal orchidopexy. Both inguinal and laparoscopic approaches were eff-

effective in the management of peeping testis^[23]. Our approach increased the number of inguinal exploration in this study.

COMMENTS

Background

In the era of minimally invasive surgery, laparoscopy was advocated as the initial approach in children with impalpable testes. Laparoscopy can confirm the presence or absence of intra-abdominal testes and can direct the subsequent approach.

Research frontiers

Controversies still exist on the best initial approach in the management of impalpable testes. Others suggested that inguinal or scrotal exploration should be used as the initial approach in children with unilateral impalpable testes.

Innovations and breakthroughs

This study showed in children with unilateral impalpable testis, 78% of children required an inguinal incision. Orchidopexies could be performed successfully in 90% of children with bilateral impalpable testes.

Applications

Laparoscopy is a safe procedure with no intra-operative complication encountered in this study. A prospective study is needed to study the best initial approach in unilateral impalpable testis.

Terminology

Cryptorchidism: Impalpable testis or undescended testis. Impalpable testis: The testis is not palpable in scrotum or at groin after general anesthesia. First stage Fowler-Stephens operation: Division of the testicular vessels which aids the development of collateral vessels along the vas deferens. Second stage Fowler-Stephens operation: Mobilization of the testis into the scrotum.

Peer-review

This is a retrospective study of 50 children with impalpable testes who have been managed by laparoscopy as the initial treatment and perhaps the initial diagnostic procedure as well. The paper is well written and the messages are clear.

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